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COGNITIVE PROCESSES IN THE DEVELOPMENT OF CHILDREN'S APPRECIATION OF HUMOR.

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THIS STUDY INVESTIGATED THE RELATIONSHIP BETWEEN CHILDREN'S HUMOR RESPONSE AND COGNITIVE DEVELOPMENT. BY USING CHILDREN OF DIFFERENT GRADE LEVELS AS SUBJECTS, IT WAS ASSUMED THAT THE STUDY WOULD INCLUDE SEVERAL LEVELS OF COGNITIVE DEVELOPMENT. TWENTY-FIVE CARTOONS WERE SHOWN TO 64 TEST CHILDREN. THE TEST CHILDREN WERE CHOSEN FROM GRADES TWO, THREE, FOUR, AND FIVE ON THE BASIS OF HAVING AVERAGE INTELLIGENCE AND ABILITY. EACH CHILD WAS SHOWN THE CARTOONS TWICE, ONCE TO OBTAIN THE CHILD'S SPONTANEOUS MIRTH RESPONSE AND HIS OPINION OF THE HUMOROUSNESS OF THE CARTOON AND AGAIN TO OBTAIN AN IDEA OF HIS COMPREHENSION OF THE JOKE INVOLVED. AN ANALYSIS OF THE THREE TYPES OF SCORES OBTAINED, (1) THE CHILD'S STATEMENT OF WHETHER THE CARTOON WAS FUNNY OR NOT, (2) THE CHILD'S FACIAL MIRTH RESPONSE, AND (3) THE CHILD'S COMPREHENSION SCORE, SHOWED THE EXISTENCE OF A POSITIVE RELATIONSHIP BETWEEN MIRTH RESPONSE AND DEGREE OF COMPREHENSION. AS THE COMPREHENSION OF THE CARTOONS BECAME EASIER FOR THE CHILDREN, HOWEVER, MIRTH RESPONSE DECLINED. THE MIRTH RESPONSE INCREASED FROM GRADES TWO TO FOUR BUT DECREASED FOR ALL LEVELS OF COMPREHENSION IN GRADE FIVE. THESE FINDINGS INDICATE THAT PERHAPS THE NATURE OF THE RELATIONSHIP BETWEEN HUMOR APPRECIATION AND COGNITIVE DEVELOPMENT IS SUCH THAT CARTOONS WHICH REQUIRE GREATER COGNITIVE ABILITY TO UNDERSTAND ELICIT A GREATER HUMOR RESPONSE. (WD)

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ABSTRACT

A Children's Mirth Response Test (CMRT) consisting of 25 cartoons was constructed and administered to 64 children of average intellect in the second, third, fourth, and fifth grades. The overall findings indicated a general positive relation between cognitive level and the comprehension of the cartoons, and a complex relation between comprehension and mirth response. While the mirth response increased in grades two through four, an unexpected but significant decrease was found between grades four and five. The hypothesis advanced to explain this decrease involved a cognitive congruency principle which held that cartoons which make few cognitive demands elicit a lower mirth response than those that are in keeping with the complexity of the child's cognitive apparatus. Analysis of the data of the present study offered some support for this hypothesis.

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Cognitive Processes in the Development of Children's Appreciation of Humor[1]

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As White (1959) has noted, psychology appears to be going through a major upheaval in respect to its view of man and his intrinsic nature. Until fairly recently, the majority of theorists of both the psychodynamic-personality and rigorous behavioristic persuasions have persisted in viewing man as a rather base creature ultimately propelled by primarily negative drives. This orientation can be seen most clearly in the great popularity of research on such phenomena as fear, anxiety, conflict, dependency, and hostility, and in the dearth of studies on such fundamentally positive human attributes as love, courage, and aestheticism. The more positive view of man that is presently emerging can be found in a number of diverse theoretical and experimental areas. We see it clearly in the ego-psychology of the psychoanalytic school, in the self-actualization concept of various personality theorists, and in the attention now being paid by behavioristically oriented experimental psychologists to such adaptive phenomena as curiosity, exploration, manipulation, and positive affectional states.

Theories concerning the nature of humor sharply reflect these contrasting modes of viewing man. That is, man's laughter and his enjoyment of humor have been interpreted variously as supporting both sides of this negative-positive dichotomy. On the negative side, some theorists have emphasized its physio-

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logical components, its tension-reducing features, and the destructive, sexual and debasing character of much humor which presumably is associated with hostile superiority feelings. Others have gone so far as to insist that man's laughter is an ontogenetic regression to the biting stage of infancy, or a phylogenetic throwback to the baring of teeth in anger, or to the posturing involved when "the hunting beast has prey at its mercy." (See Flugel (1954) for a comprehensive review of the myriad explanations that have been advanced to explain humor.) When such a general orientation is employed, attention appears to be focused mainly on the content of the humor stimulus.

In contrast to the negative orientation are those views which see humor as a liberating and creative activity. A sense of humor is regarded as not only indicative of "superior adaptation" (Flugel, 1954) or general adjustment (Hester, 1924; Loos, 1951), but is seen as a constructive and cementing force in human affairs as well. (See Coser, 1959, 1960; Goodrich, Henry & Goodrich, 1954; Hes & Levine, 1962; Worcester, 1940.) Although within this more positive approach to humor there has been some concern with its cognitive aspects, major emphasis has been given to humor's functional role in the total economy of the person in his efforts toward adjustment. As with the negative approach, the focus has been on the thematic qualities of the humor stimulus and the emotional aspects of the mirth response. Here again the cognitive processes underlying humor have been largely ignored.

Cognition not only mediates the humor process, but as Freud (1960 edition) has noted, contributes to the experienced gratification, i.e., the activation of the cognitive processes provides some of the gratification. We enjoy discovering the point of a joke and the more subtle and indirect it is, the greater the pleasure in "getting it." For example, the pleasure afforded by the double entendre, "local man takes top honors in dog show," stems from our

ability to conceptualize the two meanings. Understanding any particular joke may require a variety of cognitive processes, e.g., condensations, awareness of incongruities, and ability to comprehend unusual verbal representations. The intrinsic pleasure involved in the cognitive activity underlying humor is also encountered in such mental activities as solving puzzles or "brain twisters" and decoding mysteries.

It thus may be asserted that it is not the psychodynamic adjustive features of humor alone that result in humor being positively related to superior levels of general adaptation, but rather that this positive relation is partially mediated by the congitive processes noted above. Stated somewhat differently, the conceptual demands of a joke or a cartoon require a variety of congitive functions not unlike those demanded by a multitude of life's problems, the adequate solutions of which characterize the adjusted individual. (This is not to assert that a large number of emotional, motivational, and experiential factors which spell themselves out in the content aspects of humor are unimportant in any complete understanding of the humor response, but simply that cognitive factors are important as well.)

Some evidence has been presented suggesting a relation between the appreciation of humor and cognitive functioning as indicated by various tests of intelligence. Overlade (1954) found that comprehension of jokes was significantly related to ACE test performance, the ability to think abstractly, and the ability to discern embedded figures. Levine and Redlich (1960) found that comprehension of cartoons correlated highly with intelligence test scores for both psychiatric patients and Naval enlistees. On the other hand, Stump (1939) failed to find a significant relation between humor and intelligence as did a number of other investigators (Cattell & Luborski, 1947; Hester, 1933; Kambouropoulou, 1926, 1930; Omwake, 1939). Unequivocal data indicating a

relation between level of cognitive development, as measured by CA and MA, and appreciation of particular humor stimuli are also lacking. Although some data have been presented indicating a positive correlation between gross amount of laughter and (a) mental development (Brackett, 1934), (b) the ability to recognize absurdities (Brumbaugh, 1939), and (c) the ability to recognize incongruities (Behan & Bevan, 1956), many investigators have concluded that intellectual development is not a deciding factor in the appreciation of humor (Brackett, 1934; Ding & Jersild, 1932; Gregg, 1928; Landis & Ross, 1933; Omwake, 1939). Flugel (1954) noted that even investigators such as Wynn-Jones (1927), Piret (1940), and Mones (1939), who stressed the importance of cognitive development in humor, concluded that its operation is masked by temperament, attitude, and other emotional factors.

The part played by cognition in humor should receive its clearest demonstration in those years of childhood characterized by evolving cognitive structures. As the child progresses from one cognitive or developmental level to the next, what is humorous and what is not should also manifest a meaningful progression. Wolfenstein (1954), though primarily interested in the psychodynamic aspects of children's humor, presents some anecdotal evidence suggesting that particular differences in cognitive functioning underlie some of the differences in the appreciation of various types of humor at different ages. The major purpose of the present investigation was the further examination of the relation between cognitive development and humor appreciation. A children's humor test was constructed in which the content and level of difficulty were thought to be generally appropriate to children of varying ages. This test was administered to children of average intellect in the second, third, fourth, and fifth grades.

Method

Construction of the Children's Mirth Response Test (CMRT)

The model employed in constructing the Children's Mirth Response Test (CMRT) was the Mirth Response Test (MRT) for adults developed by Redlich, Levine and Sohler (1951). Like this earlier test, the CMRT was limited to cartoons. An initial group of 50 cartoons was selected from a variety of children's humor magazines and one adult magazine, the Saturday Evening Post. This initial pool was selected with the following three criteria in mind: (a) most of the cartoons would be appropriate for children between the ages of 7 and 15, (b) the cartoons required little or no reading skill (an effort was made to select cartoons that had no captions and were therefore completely visual), and (c) the cartoons sampled a wide range of psychological content areas, e.g., general hostility, dependency, and child-adult relations. These 50 cartoons were presented to a large number of children in the second through fifth grades, and the mirth responses and the comprehension were examined. On the basis of this pretest, 25 cartoons were selected to form the CMRT. This final selection involved the rejection of those cartoons found to be ambiguous or non-discriminating with respect to comprehension, i.e., too easy or too difficult. Only five of these cartoons require reading. In these instances, the examiner read the captions (four cartoons) or a pertinent sign (one cartoon) to the child. A description of the 25 cartoons employed in the study is presented in Table A.[2]

Procedure and Subjects

The CMRT was administered individually to a sample of 64 children in the second, third, fourth, and fifth grades (the mean CAs were 7.5, 8.6, 9.6, and 10.5, respectively). Four female Es, approximately twenty years old, each

tested 2 boys and 2 girls from each grade of four different schools. Such a design confounds experimenter and school effects. However, no combined experimenter-school effects were found. Selection of the subjects was made by the classroom teachers, who were asked to select four children who represented the typical or modal child in the class. They were specifically asked not to pick the brightest children, the dullest children, or children with any type of emotional or physical problem.

Administration

The examiner sat across from the child at a table with the 25 cartoons mounted individually on cardboard lying face down on the table. The following instructions were given:

"I have a bunch of pictures, and I want to see if you think they are funny or not. As I show you each picture, tell me whether or not you think it is funny." The E then turned the cartoons over one at a time in a constant order and recorded: (a) the spontaneous mirth response of the child, (b) whether or not the child judged it funny, and (c) any spontaneous comments of the child. Following this initial presentation of the 25 cartoons, the E said:

"Now we'll go through them again, and this time you tell me about the cartoon. What is the joke? What is supposed to be funny about it?" On the second presentation, E scored for comprehension.

Scoring

Three scores were obtained: (a) a measure of whether or not the child thought the cartoon was funny, as evidenced by a simple yes or no response, (b) a facial mirth score employing the categories:

0 = negative response (grimace, etc.)

1 = no response (blank face, etc.)

2 = inhibited to a half or slight smile

3 = full smile

4 = laugh

and (c) a comprehension score employing the categories:[3]

0 = no comprehension

1 = partial comprehension

2 = full comprehension

Reliability

In order to assess the reliability of the CMRT scoring system, two female examiners administered the CMRT to a separate sample of 4 boys and 4 girls from the second, third, fourth and fifth grades. Each examiner tested four children at each grade level (two boys and two girls), for a total of 16 children per examiner. While one examiner tested the child, the second examiner sat about 15 feet away and independently scored the child on the three scoring criteria listed above.

Funny or not funny score. Since the Funny-Not Funny Score involved only the recording of the child's stated judgment, the reliability between Es on this score was perfect.

Facial mirth response score. A number of interscorer reliability indices were obtained. The most conservative score involved the reliability between the two examiners over the 25 items for each of the 32 subjects. The 32 reliability coefficients here ranged from .09 to .92 with a median of .74 and a semi-interquartile range of .08. It should be noted that since the mirth response scale has only five categories, differences in judgment of but

a single scale unit would appreciably attenuate the correlation. The general comparability of scores across examiners was also found in the correlation computed between the two examiners' total mirth response scores for each of the 32 Ss. This reliability index was .95. No differences in reliability were found to be associated with grade level or sex. It thus appears that the mirth response score is a reasonably reliable one.

Comprehension score. The same reliability indices were employed to assess the comprehension measure as were used for the mirth response measure. Examiner reliability for each of the 32 Ss ranged from .27 to .97 with a median of .80 and a semi-interquartile range of .07. The correlation between the two examiners' total comprehension scores for the 32 Ss was .94. As with the mirth response score, no differences in reliability were found to be associated with grade level or sex.

Results and Discussion

Funny-Not Funny Analyses

The mean number of cartoons thought to be funny by Ss in the second, third, fourth, and fifth grades was 16.9, 16.2, 17.1, and 15.0, respectively. A Grade x Sex analysis of variance of the total number of cartoons judged to be funny revealed no significant effects.

Mirth Response and Comprehension Analyses

The mean mirth response and comprehension scores for each grade are presented in Table 1. A Grade x Sex analysis of variance of the mirth scores revealed a significant Grade effect ($F_{3/56} = 4.82$, $p < .01$). Neither the Sex effect ($F < 1$), nor the Grade x Sex interaction ($F_{3/56} = 1.27$) was significant. As can be seen in Table 1, the mirth response increases from grades

2 through 4 and then decreases in grade 5. The quadratic trend analysis showed this increase over the first three grades and decrease in the last grade to be significant ($F_{1/56} = 9.41$, $p < .005$). The residual effect associated with this analysis did not reach a conventional level of significance ($F_{2/56} = 2.54$, $p > .05$); so it may be assumed that the major portion of the variance associated with the Grade effect is attributable to this particular trend.

A Grade x Sex analysis of variance of the total comprehension scores revealed a Grade effect of borderline significance ($F_{3/56} = 2.25$, $p < .10$). Neither the Sex effect ($F < 1$), nor the Grade x Sex interaction ($F < 1$) was significant. As can be seen in Table 1, the mean comprehension score increased over all four grades. This increase over the four grades as tested by a linear trend analysis was found to be significant ($F_{1/56} = 6.65$, $p < .025$). The residual mean square in this analysis was found to be almost zero indicating that virtually all of the variance associated with the significant Grade effect may be attributed to this linear trend.

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Insert Table 1 about here
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An attempt was made to assess the relation between comprehension and mirth response. As can be seen in Figure 1, the mean mirth response and comprehension scores appear to be positively related at least through grade four. However, these total scores may not be sound indicators of the actual relation between mirth response and comprehension, since each score is summed across the 25 cartoons. That is, the total scores give no indication as to whether the child is amassing higher mirth response scores on those particular cartoons on which he also receives high comprehension scores. One manner of assessing this relation would be to compute a correlation between the two scores across

the 25 cartoons for each subject. However, the small ranges on both the mirth response (0-4) and comprehension (0-2) scores for any single cartoon made this procedure an insensitive one. The procedure finally employed involved assessing the subjects' mirth responses on cartoons they comprehended fully, partially, or not at all. The mean mirth response scores of the cartoons at each level of comprehension for each grade are presented in Table 2. A Grade x Sex x Levels of Comprehension Lindquist Type III analysis of variance (1953) revealed a significant Grade effect ($F_{3/56} = 4.11$, $p < .025$) and Levels of Comprehension effect ($F_{2/112} = 22.33$, $p < .001$). Neither the Sex effect nor any interaction approached statistical significance. As can be seen in Table 2, within every grade level the magnitude of the mirth response increased as the level of comprehension increased.

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Insert Table 2 and Fig. 1 about here
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One can thus conclude that there is a positive relation between the mirth response and the degree of comprehension. The significant Grade effect, which can be seen in Table 2, as well as in Table 1, was not predicted at the outset of the study. A striking feature of Table 2 is the reduction of the mirth response at all levels of comprehension in fifth as compared to fourth grade subjects. A possible explanation for this generally lower level of mirth response in the fifth grade as compared to the fourth grade can be subsumed under a principle of cognitive congruency. This principle would generate the prediction that cartoons which made few cognitive demands elicit a lower mirth response than those that are in keeping with the complexity of the child's cognitive apparatus. That is, it is possible that for the fifth grade many of the cartoons are too easily comprehended, and this very ease of comprehension reduces their funniness. What is being suggested here is the view advanced

by Levine (in press) that the mirth response in part reflects the sheer pleasure of "getting the joke." This pleasure would be expected to decrease if the joke makes little demand on the person's cognitive abilities. Thus, humor can be viewed in part as the emotional expression accompanying the satisfaction of what White (1959) has referred to as the effectance motive.

One problem with this hypothesis is that it appears to be contra-indicated by the data presented in Table 2 where one finds for all grades, including the fifth, the highest mirth response scores on those cartoons which are fully comprehended. However, with respect to this particular issue, Table 2 is somewhat misleading since the number of cartoons employed within any cell to obtain the average mirth response varies from cell to cell. As found in an earlier analysis, the fifth grade group comprehends more of the cartoons than any other group. Thus, it is possible for the fifth grade group, the large number of cartoons that receive a level 2 comprehension score includes some cartoons that are just barely comprehended, and are therefore humorous, as well as other cartoons that are too easily comprehended and are therefore not considered humorous. Consistent with our thinking, this latter type of reaction should not be present in the younger children due to their lesser cognitive abilities. The data of the present study were reanalyzed in order to test this hypothesis.

The difficulty level of each of the 25 cartoons, as measured by the mean comprehension score, was assessed at each grade level, and the cartoons were ranked from most difficult to easiest. It was found that the difficulty ranks of the cartoons are correlated across grades. (In the few instances where there are wide discrepancies across the grades in difficulty level assessed by rankings, these cartoons were found to be fairly comparable in respect to difficulty level assessed by the mean comprehension scores.) These ranks were

then employed to divide the cartoons into five categories based on ease of comprehension for each grade. The mean mirth scores associated with each difficulty level for each grade are presented in Table 3. The pattern of these mirth response scores appears to offer some support for the difficulty or cognitive congruency hypothesis.

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Insert Table 3 about here
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In grade 2 we see no clear association between difficulty level and mirth response. However, it is probable that even the easiest cartoons are still too difficult for these children; and as a result, the relation between difficulty level and mirth response is most ambiguous. In grade 3 we get a linear progression in which the easiest cartoons receive the greatest mirth response score. At this grade level, the easiest cartoons are still "stretching" the cognitive abilities of the subjects. At the fourth grade level, we see a linear progression between mirth response and four of the difficulty levels, but we find a drop in the mirth response in the easiest category. It thus appears that this category is becoming too easy to be funny for even the fourth graders. We find this trend most markedly in the fifth grade where it is the more difficult cartoons that receive the highest mirth response scores. Consistent with our hypothesis, the mirth response scores fall off for the fifth graders as the cartoons become easier. Since the hypothesis under investigation was advanced to explain the decrease in the mirth response between the fourth and fifth grade, the data from Table 4 for these two grade levels was subjected to a statistical analysis. A repeated measures analysis of variance (Grade x Difficulty level) resulted in a significant Grade effect ($F_{1/30} = 8.89$, $p < .01$) and a significant Grade x Difficulty level interaction ($F_{4/120} = 3.68$, $p < .01$). The main effect for difficulty was not significant

($F_{4/120}$ = 1.70, $p > .10$). The significant Grade effect reflects the earlier finding that fifth graders tend to have lower mirth response scores than fourth graders. It is the significant interaction that provides the statistical evidence in support of the difficulty hypothesis. This interaction indicates that the pattern of findings discussed above is a statistically reliable one.

Relation of Comprehension and Mirth Scores to Funny-Not Funny Ratings

In order to assess the relationship between comprehension and the children's ratings of funny-not funny, the mean comprehension scores were compared for cartoons rated to be funny and not funny at each grade. A Grade x Sex x Funny-Not Funny Lindquist Type III analysis of variance of these comprehension scores revealed a significant Funny-Not Funny effect ($F_{1/56}$ = 32.42, $p < .001$) and a significant Grade effect ($F_{3/56}$ = 3.49, $p < .05$). Neither the Sex effect nor any of the interactions approached statistical significance. The Funny-Not Funny effect indicates that within each grade the comprehension scores for cartoons judged funny was higher than for those judged not funny. The significant Grade effect reflects the tendency already noted for comprehension scores to increase from the second through the fifth grade. It can thus be concluded that cartoons which are judged funny receive higher comprehension scores than cartoons judged not funny and that comprehension increases with age.

The relation between the children's ratings of Funny-Not Funny and their mirth responses was also assessed. A Grade x Sex x Funny-Not Funny Lindquist Type III analysis of variance of the mirth response scores revealed a highly significant Funny-Not Funny effect ($F_{1/56}$ = 206.92, $p < .001$). Neither the Sex effect, Grade effect, nor any of the interactions approached statistical

significance. The Funny-Not Funny effect indicates that the mirth responses at each grade level for cartoons judged to be funny are higher than for those judged to be not funny.

Conclusions

The overall findings indicate that there is a general positive relation between cognitive ability and humor expression. Although there can be little doubt that personality dynamics, interacting with the particular content of the humor stimuli, are important in determining the overt humor response, the positive relation between cognitive ability and humor expression found from grades two through four makes it clear that cognitive ability should be recognized as another important factor.

An unexpected finding in the present study was the decrease in the mirth response between grades four and five. A hypothesis involving a cognitive congruency principle was advanced to explain this decrease. This hypothesis held that cartoons which made little cognitive demands are perceived as being less funny than those that are in keeping with the complexity of the child's cognitive apparatus. Analysis of the findings of the present study offered some support for this hypothesis.

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Footnotes

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2. Table A has been deposited with the American Documentation Institute. Order Document No. , remitting $ for 35-mm. microfilm or $ for 6 by 8 in. photocopies.

3. A four-page manual for scoring comprehension on the CMRT was developed and may be obtained from the American Documentation Institute. Order Document No. , remitting $ for 35-mm. microfilm or $ for 6 by 8 in. photocopies.

Table 1

Mean Mirth and Comprehension Scores for each Grade Level

Grade	N	Mirth Response		Comprehension	
		Mean	S.D.	Mean	S.D.
Second	16	46.1	13.32	24.1	9.88
Third	16	50.2	12.28	26.6	7.42
Fourth	16	53.4	14.59	28.9	9.22
Fifth	16	46.1	13.94	32.2	9.70

Table 2

Mean Mirth Scores of Cartoons at each

Level of Comprehension by Grade

Comprehension Level	Grade			
	Second (N-16)	Third (N-16)	Fourth (N-16)	Fifth (N-16)
0	1.68	1.76	1.81	1.30
1	1.86	2.12	2.35	1.76
2	1.89	2.20	2.58	1.94

Table 3

Mean Mirth Scores Associated with each

Difficulty Level for each Grade

Difficulty Level	Grade			
	Second (N-16)	Third (N-16)	Fourth (N-16)	Fifth (N-16)
Most Difficult	29.0	29.8	34.0	28.4
Difficult	28.8	31.6	34.8	31.2
Intermediate	30.4	32.0	38.6	29.4
Easy	30.0	32.2	41.8	28.0
Most Easy	29.2	34.4	38.4	26.4

Figure Caption

Fig. 1. Mean Mirth and Comprehension Scores in Percentages for Second, Third, Fourth, and Fifth Grades.